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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/978,257	10/15/2001	Akira Yamauchi	S004-4419	4109

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ADAMS & WILKS
ATTORNEYS AND COUNSELORS AT LAW
31st FLOOR
50 BROADWAY
NEW YORK, NY 10004

EXAMINER

MULLINS, BURTON S

ART UNIT	PAPER NUMBER
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2834

DATE MAILED: 11/14/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/978,257	Applicant(s) YAMAUCHI ET AL.	
	Examiner Burton S. Mullins	Art Unit 2834	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 May 2003 and 15 July 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 8-14 and 17-29 is/are pending in the application.
- 4a) Of the above claim(s) 18-22 and 29 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 8,9,12-14,17,23 and 26 is/are rejected.
- 7) ☒ Claim(s) 10,11,13,14,24,25,27 and 28 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of the invention Group I in the response filed 15 July 2003 is acknowledged. The applicant notes that claims 9-14 and 17 belong to Group I and the examiner agrees. However, the traversal of the restriction between the three groups is not based on any grounds and thus is not found persuasive. The requirement is still deemed proper and is therefore made FINAL. Claims 18-22 and 29 are therefore withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to nonelected Groups II&III, there being no allowable generic or linking claim. Action on the merits of claims 8-14, 17 and 23-28 follows (claims 15-16 having been previously cancelled).

Claim Objections

2. Claim 17 is objected to because of the following informalities: On the last line, before "motor" insert --the-- . Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. Claims 11-14 and 26 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In claims 11-12 and 26, recitation "a plurality of coils wound around the respective magnetic poles" is indefinite because it is not clear if this means the coils are wound on the stator and thus are "wound around" the rotor poles by virtue of the fact that the stator surrounds the rotor, or if the coils are wound directly on rotor poles. Since

the latter interpretation does not seem to be supported by the specification, the former interpretation will be made.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 8-9, 17 and 23 are rejected under 35 U.S.C. 102(b) as being anticipated by Fukao et al. (US 5,936,370). Fukao teaches a magnetic bearing apparatus comprising: a rotor 50 (Fig.9); a motor having stator coils Na/Nb for generating a rotary magnetic field for rotating the rotor (c.7, lines 25-26); magnetic supporting coils or “position control windings” $N\alpha$ and $N\beta$ (c.7, lines 27-28) for producing a magnetic force for magnetically supporting the rotor in a radial direction thereof (see also c.2, lines 57-60, with reference to motor windings C4 and magnetic bearing windings C2 in Fig.8); composite magnetic force inferring means comprising a “mutual inductance matrix” M (c.10, lines 12-15; see also, e.g., equation [12] expressing mutual inductance M_{aa} between the motor windings and magnetic bearing windings) for inferring composite vectors of the magnetic forces Aa/Ab (related to fluxes Ψ_a and Ψ_b by equations [6] and [7]) affecting the rotor based on the rotary magnetic field (c.7, lines 51-52); and magnetic support adjustment means comprising the controller 82 which adjusts the magnetic force produced by the magnetic supporting coils to offset the composite vectors of the magnetic force in the motor by estimating displacement of the rotor 50 and

magnitude of the rotating field (c.10, lines 25-30), generating command values $F\alpha$ and $F\beta$, and applying voltages to the magnetic bearing windings (c.10, lines 31-39).

Regarding claim 9, the magnetic bearing coils support the rotor 50 “at a position at which an axis of rotation of the rotor passes through a gravitational center of the rotor” since this position would be when the rotor tilts in the α and/or β positions (Fig.2; c.9, lines 13-14).

Regarding claim 17, the application of command values $F\alpha$ and $F\beta$ by the controller 82, whereby voltages are applied to the magnetic bearing windings in response to displacement of the rotor 50 (c.10, lines 16-39) includes “adjust[ment of] the magnetic force produced by the [magnet] supporting coils” and inherently “reduces vibration of the motor caused by unbalance in a magnetic force generated by [the] motor and represented by the composite vectors”, i.e., the composite vectors calculated in the mutual inductance matrix equations [11-14].

Regarding claim 23, the matrix M is both a composite magnetic force inferring and determining means since the magnetic force vectors are derived in Fukao by the controller 82 using the magnetomotive force equations [1]-[4], the matrix equations [10] and [13]-[15] and the mutual inductance equations [12]. Vibration is inherently reduced since Fukao teaches that his apparatus achieves “stable position control” (c.5, lines 14-15).

Claim Rejections - 35 USC § 103

6. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

7. Claims 12 and 26, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukao as applied to claims 8 and 23 above, in view of Chiba et al. (US 5,880,549). Fukao substantially teaches applicant's invention including a brushless motor having a plurality of motor coils Na/Nb wound around the rotor 12 (Fig.2); however, Fukao does not teach that the motor is a DC motor, per se, or that the rotor comprises plural poles fixed thereto.

Chiba teaches a brushless, reluctance rotator including a combined motor and magnetic bearings, the former motor comprising coils 24 which generate torque from an applied DC current from an inverter (Fig.29; c.3, lines 36-50). The rotor 22 comprises plural poles (Fig.29). Use of such a reluctance machine allows for independent control of the windings (c.1, lines 59-61).

It would have been obvious to modify Fukao's motor and provide a DC reluctance motor with rotor poles per Chiba since this would have been desirable to independently control the energization of the windings.

Allowable Subject Matter

8. Claims 10, 24-25 and 27-28 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claims 10 and 24 recite a magnetic flux detector for detecting/inferring a magnetic flux existing in an air gap between a magnetic pole of the motor and the stator coils, with inferring/determining means for inferring/determining the composite vectors...based on the flux detected by the magnetic flux detector. Fukao does not

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use a magnetic flux detector in the air gap between a magnetic pole of the motor and the stator coils. Fukao employs terminal voltages of the magnetic bearing windings C2 to detect rotor position (c.10, lines 19-30), and from this the proportional mutual inductance and associated fluxes (c.10, lines 24-30). In fact, by using the magnetic bearing winding currents to detect rotor position and magnetic fluxes, Fukao notes that displacement sensors are not needed, thereby reducing the number of wires and raising reliability while reducing costs (c.10, lines 50-57). To provide distinct magnetic flux detectors in the air gap would thus appear to run contrary to Fukao's desire to reduce wires and costs associated with additional sensors. Claim 27 recites, in combination with other elements, a radial position sensor for detecting movement of the rotor in the vicinity of the radial position sensor, respectively. While rotor position is determined in Fukao, he does not use a radial position sensor to do so, relying instead on measuring terminal voltages of the magnetic bearing windings C2 to detect rotor position (c.10, lines 19-30). In fact, by using the magnetic bearing winding currents to detect rotor position, Fukao notes that displacement sensors are not needed, thereby reducing the number of wires and raising reliability while reducing costs (c.10, lines 50-57). Thus, to provide a distinct radial position sensor would appear to run contrary to Fukao's desire to reduce wires and costs associated with displacement sensors.

9. Claims 13-14 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims. Claim 13 recites, in combination with other elements, a radial position sensor for detecting movement of the rotor in the radial direction. While rotor position is determined in Fukao, he does not use a radial position sensor

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to do so, relying instead on measuring terminal voltages of the magnetic bearing windings C2 to detect rotor position (c.10, lines 19-30). In fact, by using the magnetic bearing winding currents to detect rotor position, Fukao notes that displacement sensors are not needed, thereby reducing the number of wires and raising reliability while reducing costs (c.10, lines 50-57). Thus, to provide distinct radial position sensors in the air gap would appear to run contrary to Fukao's desire to reduce wires and costs associated with displacement sensors.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Burton S. Mullins whose telephone number is 305-7063. The

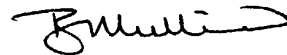
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examiner can normally be reached on Monday-Friday, 9 am to 5 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nestor Ramirez can be reached on 308-1371. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 308-0956.



Burton S. Mullins
Primary Examiner
Art Unit 2834

Bsm
30 October 2003